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LISTS OF SPECIES

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Floristic composition and dispersal syndromes in Araucaria Forest remnants in the municipality of Colombo, Paraná state, Brazil

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Abstract: This study was conducted in Araucaria Forest remnants in the municipality of Colombo, eastern Paraná state, Brazil. Data on species occurrence, life forms and dispersal syndromes were collected once a week along a 9 km transect, revealing the presence of 512 species among trees (n = 135), shrubs (n = 121), herbs (n = 157), climbers (n = 70), epiphytes (n = 24) and hemiparasites (n = 5). Of 469 species classified according to dispersal syndromes, 42.4% were zoochoric, 33.6% autochoric and 23.8% anemochoric. The high richness observed, the highest among similar studies previously conducted in the Araucaria Forest, along with the occurrence of endangered species of trees (and mammals), indicates that the study area is an important remnant for biodiversity conservation.

Key words: floristic inventory, Araucaria Forest, seed dispersal, dispersal syndromes, biodiversity conservation

INTRODUCTION

Mixed Ombrophyllous Forest ("Floresta Ombrófila Mista", FOM according to the Brazilian classification system), also known as Araucaria Forest, is an Atlantic Forest formation. It occurs in the southern area of the states of Paraná, Santa Catarina, Rio Grande do Sul and in the southern region of São Paulo state and also in disjoint areas in the Serra da Mantiqueira mountain range, between São Paulo and south Minas Gerais states (IBGE 1992). For Hueck (1953), the limits of FOM expand to remote areas of the state of Rio de Janeiro to the north and to Argentina towards the south. In Paraná, this formation is present from 500 m altitude, starting in the western slopes of Serra do Mar, towards the First, Second and Third ("Primeiro", "Segundo" and "Terceiro") Paraná plateaus (Maack 1980). In its original distribution, the FOM covered approximately 200,000 km² of Paraná, covering 40% of the surface of this state (Klein 1960). However, today the Paraná FOM is reduced to less than 1% of preserved native forests, distributed in small remnants surrounded by a modified matrix (Castella and Britez 2004), such as those occurring in the metropolitan region of Curitiba (Kozera et al. 2006), where property speculation is one of the main degradation agents.

Among the various floristic surveys in the FOM (Carvalho 1980; Oliveira and Rotta 1982; Galvão et al. 1989; Negrelle and Silva 1992; Koehler et al. 1998; Sanquetta et al. 2001), few have collected all life forms (Britez et al. 1995; Kozera et al. 2006; Liebsch et al. 2009), as pointed out by Liebsch et al. (2009). It is notable that most studies give preference to tree species at the expense of other life forms, even if in some cases the trees represent less than half the local plant diversity (Kozera et al. 2006; Liebsch et al. 2009).

Regarding seed dispersal, plant species can be classified into three groups, depending on the presence of appropriate structures to facilitate dispersal: zoochoric (animals), anemochoric (wind) and autochoric (explosive devices) (van der Pijl 1972). In tropical forests, zoochory is the most common dispersal syndrome among tree species (Tabarelli et al. 1999; Talora and Morellato 2000; Mikich and Silva 2001; Almeida-Neto et al. 2008; Liebsch et al. 2008). The same pattern has

also been found for FOM trees (Rondon Neto et al. 2001; Liebsch and Acra 2007; Liebsch et al. 2009).

The present study presents the floristic composition of FOM remnants located in the city of Colombo, Paraná state, including diverse life forms and dispersal syndromes. As the study area borders a large urban center, it is expected that the results may assist in its protection and conservation, besides contributing to increase the knowledge regarding the FOM as a whole.

MATERIALS AND METHODS

Study area

The study was conducted in a 301 ha area that belongs to the Brazilian Agricultural Research Corporation — Embrapa Forestry (25°26′52″ S, 049°13′50″ W), located in the municipality of Colombo, 30 km from the state capital Curitiba. The average elevation of the study area is 928 m above sea level and the climate is type Cfb, according to the Koeppen classification system (Koeppen 1948). Historical rainfall data (1984 and 2001) collected in the area showed that the average annual rainfall is 1,403.5 mm, the rainiest month is January with an average of 198 mm, and the least rainy is August, averaging 64.77 mm.

In total, 124 ha of the area are FOM remnants in various successional stages (Rotta 1981). The area also contains forest plantations of native and exotic species, areas devoid of trees and scrubs and marsh land. The area is also traversed by water courses, including the Palmital River, which originates in the city of Colombo (Figure 1). The best preserved parts of the FOM remnants have a canopy formed by trees of up to 30 m tall, with a predominance of *Araucaria angustifolia* (Bertol.) Kuntze and under-canopy of up to 20 m, while the less conserved parts are characterized by a 15 m canopy and the presence of *Ilex paraguariensis* A. St. Hil.

Data collection

For the collection of reprodutive material (flowers and fruits) weekly surveys were conducted along 9 km of roads and trails that crossed and bordered the forest remnants of the study area (Figure 1). Samples were collected in two periods, from April 2003 to March 2004 and April 2005 to March 2006. All environments (except the experimental plantations of native and exotic species) and life forms (trees, shrubs, climbers, herbs, epiphytes, hemiparasites) found in the study area were sampled.

The collected material was identified based on literature, reference collections and experts. Later the vouchers were deposited in the Herbarium Fernando Cardoso da Silva (HFC) of Embrapa Forestry, with duplicates sent

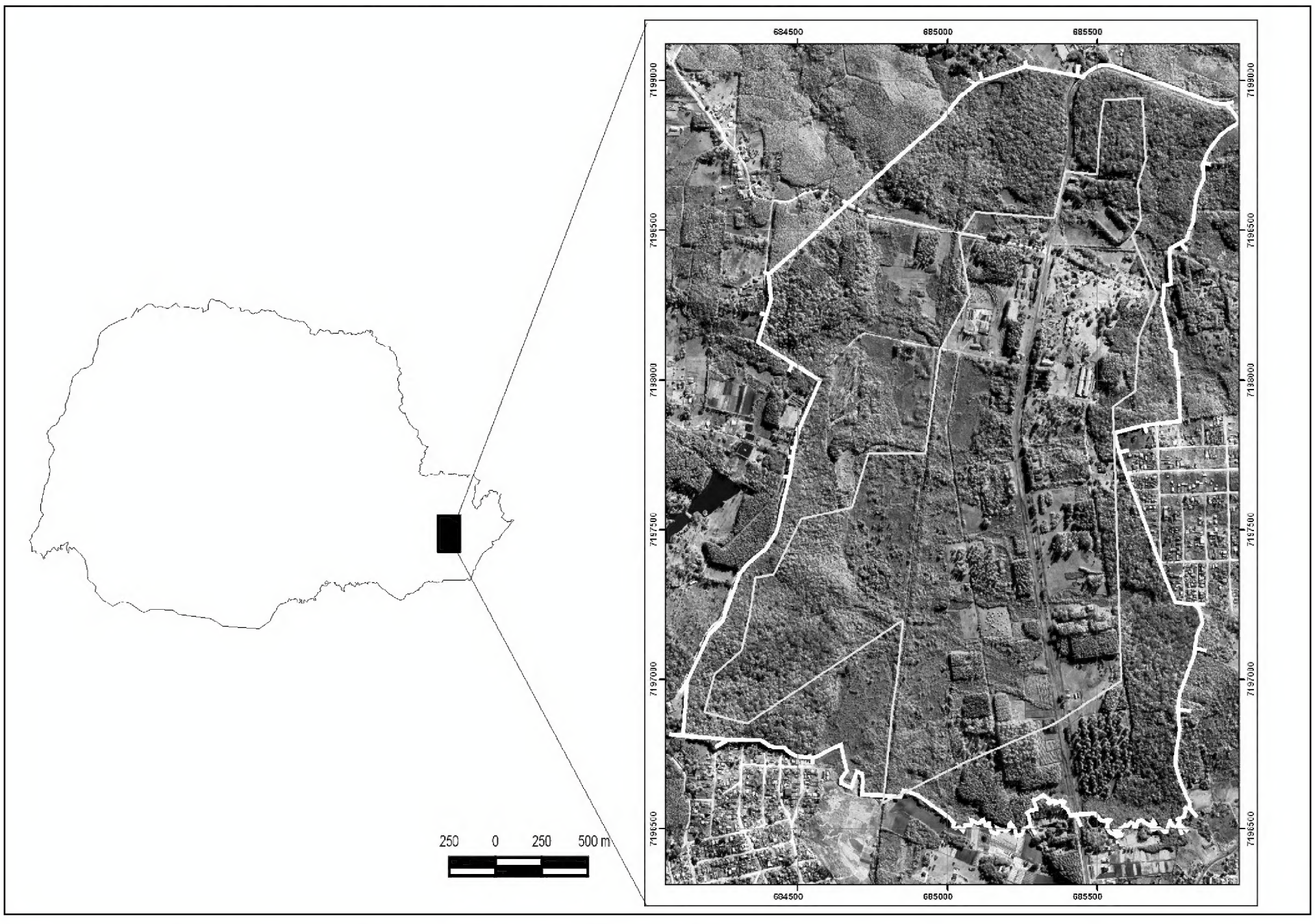

Figure 1. Detail of the study area and the transect (narrow line) used to collect the data within Embrapa Forestry field station limits (thick line), Colombo, Paraná state (left map), Brazil.

to the Municipal Botanical Museum of Curitiba (MBM), the Herbarium of the Federal University of Paraná (UPCB) and Rio de Janeiro Botanical Garden (RB). The validity of scientific names was checked using the List of Species of the Brazilian Flora ("Lista de Espécies da Flora do Brasil") website (http://floradobrasil.jbrj.gov.br/) and The Plant List (http://www.theplantlist.org/). The taxonomic classification followed the Angiosperm Phylogeny Group (APG III 2009).

Data analysis

Collected species were classified according to life form (tree, shrub, climber, herb, epiphyte, hemiparasite), type of fruit (fleshy indehiscent, fleshy dehiscent, dry indehiscent and dry dehiscent, following Barroso et al. (1999) and Mikich and Silva (2001)), dispersal syndrome (van der Pijl 1972) and colouring (Wilson et al. 1990).

RESULTS

A total of 512 plant species were recorded in 102 families and additional 13 taxa were identified only to genus or family level (Table 1). The most important families were Asteraceae (n = 79), Fabaceae (*n* = 34), Solanaceae (*n* = 27) and Myrtaceae (*n* = 19), which together represented 31% of species. Among genera, the richest were *Solanum* (*n* = 18), *Baccharis* (*n* = 12), *Ocotea* (*n* = 9), *Myrcia* (*n* = 8) and *Leandra* (*n* = 5), totaling 51 species.

Three species, *Araucaria angustifolia*, *Ocotea porosa* and *O. odorifera,* are endangered according to MMA (2008). A total of 47 exotic species (IAP 2007) were recorded, with Fabaceae exhibiting the greatest richness, with 11 (23%) species.

Taking into account the classification of species in different habits, the greatest richness was observed for herbs (*n* = 157), followed by trees (*n* = 135) (Table 2). If we separate all species in only two groups, trees and non-trees, most species would be "non-trees" (74%).

The dispersal characteristics and syndromes were described for 469 taxa, which corresponds to 91% of all recorded species. Zoochorous fruits were the most common (*n* = 199), followed by autochorous (*n* = 158) and anemochorous (*n* = 112). When life forms were taken into account, zoochory was more common among trees, encompassing 73% of species (*n* = 98), followed by autocory (*n* = 18) and anemochory (*n* = 17) (Table 3). Zoochory was also the most common syndrome among shrubs, but with a lower percentage of species (47%). In herbaceous species, there was a predominance of autochory with 78 species (60%), followed by anemochory with 37 species (28%), and zoochory with

Table 1. Characteristics of plant species collected at Embrapa Florestry field station located in Colombo, PR, Brazil. Where: # HFC (record number as in the "Herbário Fernando Cardoso da Silva"); LF (life form) TR = tree, SH = shrub, CL = climber, HB = herb, EP = epiphyte, HM = hemiparasite; TF (type of fruit) FD = fleshy dehiscent, FI = fleshy indehiscent, DD = dry dehiscent, DI = dry indehiscent; DS (dispersal syndrome) AN = anemochoric, AT = autochoric, ZC = zoochoric; FC (fruit color) YE = yellow, OR = orange, BR = brown, BL = black, PU = purple, GR = green, RE = red, BU = burgundy; * exotic species.

FAMILY	SPECIES	# HFC	LF	TF	DS	FC
Acanthaceae	*Hygrophila costata* Nees	7687, 7730	SH	DD	AT	BR
	Justicia floribunda (C.Koch) Wassh.	7166	SH	DD	AT	BR
	Mendoncia puberula Mart.	6752	CL	FI	ZC	BL
	Thunbergia alata Bojer ex Sims*	7186	CL	DD	AT	BR
Alismataceae	*Echinodorus grandiflorus* (Cham. & Schltdl.) Micheli	6016	HB	DD	AT	BR
Alstroemeriaceae	*Bomarea edulis* (Tussac) Herb.	7698	CL	DD	AT	BR
Amaranthaceae	*Alternanthera brasiliana* (L.) Kuntze	7727	HB	DD	AT	BR
	Dysphania ambrosioides (L.) Mosyakin & Clemants	7058	HB	DD	AT	BR
Amaryllidaceae	*Amaryllis* sp. *	7380	HB	DD	AN	BR
	Habranthus robustus Herb. ex Sweet.	7612	HB	DD	AN	BR
	Nothoscordum nudicaule (Lehm.) Guagl.	6983, 7383	HB	DD	AN	BR
Anacardiaceae	*Lithrea brasiliensis* Marchand	6536	TR	FI	ZC	BL
	Schinus terebinthifolius Raddi	6480	TR	FI	ZC	RE
	Schinus polygamus (Cav.) Cabrera	7369, 7370, 7371	TR	FI	ZC	RE
Annonaceae	*Annona rugulosa* (Schltdl.) H.Rainer	6701	TR	FI	ZC	GR
	Guatteria australis A.St.-Hil.	7671	TR	FI	ZC	BL
Apiaceae	*Cyclospermum leptophyllum* (Pers.) F.Muell. ex. Benth.	7208	HB	DD	AT	BR
	Cryptotaenia canadensis (L.) DC.*	7627	HB	DD	AT	BR
	Eryngium eburneum Decne.	7732	HB	DD	AT	BR
	Foeniculum vulgare Mill.*	7620	HB	DD	AT	BR
	Indeterminada	7728	HB	-	-	-
Apocynaceae	*Araujia sericifera* Brot.	7010, 7011	CL	DD	AN	GR
	Asclepias curassavica L.	7007, 7008	HB	DD	AN	BR
	Condylocarpon isthmicum (Vell.) A.DC.	6522, 7630	CL	DD	AT	BR
	Jobinia lindbergii E.Fourn.	6699, 7696	CL	DD	AT	BR
	Orthosia urceolata E.Fourn.	7188, 7386	CL	DD	AT	BR

Continued

Table 1. *Continued.*

FAMILY	SPECIES	# HFC	LF	TF	DS	FC
	Oxypetalum mosenii (Malme) Malme	7013	CL	DD	AT	BR
	Oxypetalum pannosum Decne.	7734, 7753	CL	DD	AN	BR
	Oxypetalum wightianum Hook. & Arn.	7731	CL	DD	AN	BR
	Peltastes peltatus (Vell.) Woodson	7362	CL	DD	AT	BR
Aquifoliaceae	*Ilex dumosa* Reissek	6434, 6435, 7243	TR	FI	ZC	RE
	Ilex microdonta Reissek	7393	TR	FI	ZC	RE
	Ilex paraguariensis A.St.-Hil.	6353, 6370, 6545	TR	FI	ZC	RE
	Ilex theezans Mart. ex Reissek	6440	TR	FI	ZC	BL
Araceae	*Philodendron loefgrenii* Engl.	7733	EP	-	-	-
	Spathicarpa hastifolia Hook.	7385	HB	-	-	-
	Zantedeschia aethiopica (L.) Spreng.*	7276	HB	-	-	-
Araliaceae	*Hydrocotyle exigua* (Urb.) Malme	7246	HB	-	-	-
	Oreopanax fulvus Marchal	7657, 7658	TR	-	-	-
	Schefflera calva (Cham.) Frodin & Fiaschi	6718	TR	FI	ZC	BL
Araucariaceae	*Araucaria angustifolia* (Bertol.) Kuntze		TR	DD	ZC	BR
Arecaceae	*Syagrus romanzoffiana* (Cham.) Glassman	7201	TR	FD	ZC	YE
Asparagaceae	*Asparagus setaceus* (Kunth) Jessop *	7606	HB	-	-	-
Asteraceae	*Adenostemma brasilianum* (Pers.) Cass.	7724	HB	DI	AN	-
	Adenostemma verbesina (L.) Kuntze	7040, 7690	HB	DI	AN	-
	Ageratum conyzoides L.	7020	HB	DI	AN	-
	Ambrosia polystachya DC.	7760	SH	DI	AN	-
	Austroeupatorium inulaefolium (Kunth) R.M.King & H.Rob.	7022, 7023	SH	DI	AN	-
	Austroeupatorium laetevirens (Hook. & Arn.) R.M.King. & H.Rob.	7594	SH	DI	AN	-
	Austroeupatorium picturatum (Malme) R.M.King & H.Rob.	7596	SH	DI	AN	-
	Baccharis anomala DC.	7042	CL	DI	AN	-
	Baccharis caprariifolia DC.	6745	SH	DI	AN	-
	Baccharis crispa Spreng.	6743	HB	DI	AN	-
	Baccharis dentata (Vell.) G.M.Barroso	7414	SH	DI	AN	-
	Baccharis dracunculifolia DC.	7759	SH	DI	AN	-
	Baccharis helichrysoides DC.	7228, 7728	SH	DI	AN	-
	Baccharis megapotamica Spreng.	7704	SH	DI	AN	-
	Baccharis pseudomyriocephala Malag.	7413	SH	DI	AN	-
	Baccharis punctulata DC.	7702, 7703	SH	DI	AN	-
	Baccharis semiserrata DC.	6466	TR	DI	AN	-
	Baccharis uncinella DC.	7028, 7029	SH	DI	AN	-
	Baccharis vulneraria Baker	7041, 7161	SH	DI	AN	-
	Bidens alba (L.) DC.	7155	HB	DI	AN	-
	Calyptocarpus brasiliensis (Ness & Mart.) B.Turner	7036	HB	DI	AN	-
	Campovassouria cruciata (Vell.) R.M.King & H.Rob.	7021, 7262	SH	DI	AN	-
	Campuloclinium macrocephalum (Less.) DC.	7604, 7689	SH	DI	AN	-
	Chaptalia integerrima (Vell.) Burkart	7299	HB	DI	AN	-
	Chaptalia nutans (L.) Pol.	7237	HB	DI	AN	-
	Chromolaena congesta (Hook. & Arn.) R.M.King & H.Rob.	7712	SH	DI	AN	-
	Chromolaena laevigata (Lam.) R.M.King & H.Rob.	7027	SH	DI	AN	-
	Chromolaena pedunculosa (Hook. & Arn.) R.M.King & H.Rob.	7026	SH	DI	AN	-
	Chrysanthemum myconis L.*	6725	HB	DI	AN	-
	Chrysolaena platensis (Spreng.) H.Rob.	7605	HB	DI	AN	-
	Conyza bonariensis (L.) Cronquist	7721	SH	DI	AN	-
	Conyza primulifolia (Lam.) Cuatrec. & Lourteig	7686	SH	DI	AN	-
	Cotula australis (Sieber ex Spreng.) Hook. f.	7298	HB	DI	AN	-
	Crepis japonica (L.) Benth. *	7152	HB	DI	AN	-
	Dendrophorbium limosum C. Jeffrey	7045	SH	DI	AN	-
	Disynaphia littoralis (Cabrera) R.M.King. & H.Rob.	7595	SH	DI	AN	-
	Eclipta prostrata (L.) L.	7037	HB	DI	AN	-
	Elephantopus mollis Kunth	7030	HB	DI	AN	-
	Exostigma notobellidiastrum (Griseb.) G.Sancho	6746, 7415, 7416	HB	DI	AN	-
	Galinsoga parviflora Cav.	7297	HB	DI	AN	-
	Gamochaeta simplicicaulis (Willd. ex Spreng.) Cabrera	7725, 7726	SH	DI	AN	-
	Grazielia serrata (Spreng.) R.M.King. & H.Rob.	7680	SH	DI	AN	-
	Hypochoeris radicata L.	6726, 7163	HB	DI	AN	-
	Jaegeria hirta (Lag.) Less.	7038	HB	DI	AN	-

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Table 1. *Continued.*

FAMILY	SPECIES	# HFC	LF	TF	DS	FC
	Jungia floribunda Less.		HB	DI	AN	-
	Leptostelma maximum D.Don	7044	HB	DI	AN	-
	Lessingianthus glabratus (Less.) H.Rob.	7602, 7603	HB	DI	AN	-
	Mikania burchellii Baker	7411	CL	DI	AN	-
	Mikania cordifolia (L.f.) Willd.	7046, 7777	CL	DI	AN	-
	Mikania glomerata Spreng.	7203	CL	DI	AN	-
	Mikania hirsutissima DC.	7162, 7304	CL	DI	AN	-
	Mikania sericea Hook. & Arn.	7154	CL	DI	AN	-
	Moquiniastrum polymorphum (Less.) G.Sancho	7601	TR	DI	AN	-
	Moquiniastrum polymorphum subsp. *floccosum* (Cabrera) G.Sancho	7417	TR	DI	AN	-
	Mutisia coccinea A.St.-Hil.	7216	CL	DI	AN	-
	Mutisia speciosa Aiton ex Hook.	7227	CL	DI	AN	-
	Noticastrum calvatum (Baker) Cuatrec.	7039	HB	DI	AN	-
	Orthopappus angustifolius (Sw.) Gleason	7722	SH	DI	AN	-
	Piptocarpha axillaris (Less.) Baker	6454, 6456	TR	DI	AN	-
	Piptocarpha regnellii (Sch.Bip.) Cabrera	6463, 7159	TR	DI	AN	-
	Pterocaulon balansae Chodat	7713	SH	DI	AN	-
	Raulinoreitzia leptophlebia (B.L.Rob.) R.M.King & H.Rob.	7024	TR	DI	AN	-
	Senecio brasiliensis (Spreng.) Less.	7278	SH	DI	AN	-
	Smallanthus cornnatus (Spreng.) H.Rob.	7599, 7600	SH	DI	-	BL
	Solidago chilensis Meyen	7032, 7034	HB	DI	AN	-
	Sonchus oleraceus L.	7221	HB	DI	AN	-
	Sphagneticola trilobata (L.) Pruski	7035	HB	DI	AN	-
	Symphyopappus compressus (Gardner) B.L.Rob.	7715	HB	DI	AN	-
	Tagetes minuta L.	7033	HB	DI	AN	-
	Taraxacum officinale F.H.Wigg.	7157	HB	DI	AN	-
	Trixis lessingii DC.	7694	CL	DI	AN	-
	Urolepis hecatantha (DC.) R.M.King & H.Rob.	7025, 7593, 7778	HB	DI	AN	-
	Verbesina sordescens DC.	7043, 7761, 7762	SH	DI	AN	-
	Vernonanthura discolor (Spreng.) H.Rob.	6464, 7017	TR	DI	AN	-
	Vernonanthura montevidensis (Spreng.) H.Rob.	7591	SH	DI	AN	-
	Vernonanthura petiolaris (DC.) H.Hob.	7156	TR	DI	AN	-
	Vernonanthura phosphorica (Vell.) H.Rob.	7597	TR	DI	AN	-
	Vernonanthura puberula (Less.) H.Rob.	6455, 7018	TR	DI	AN	-
	Vernonanthura tweedieana (Baker) H.Rob.	7592	SH	DI	AN	-
Basellaceae	*Anredera cordifolia* (Tem.) Steenis	7729	CL	-	-	-
Begoniaceae	*Begonia cucullata* Willd.	7006	HB	DD	AT	BR
	Begonia echinosepala Regel	7002	HB	DD	AT	BR
	Begonia fischeri Schrank	7003, 7004, 7005	HB	DD	AT	BR
	Begonia radicans Vell.	7001	HB	DD	AT	BR
Berberidaceae	*Berberis laurina* Billb.	6753, 7672	SH	FI	ZC	PU
Bignoniaceae	*Amphilophium crucigerum* (L.) L.G.Lohmann	6978	CL	DD	AN	BR
	Amphilophium dolichoides (Cham.) L.G.Lohmann	6979	CL	DD	AN	BR
	Dolichandra unguis-cati (L.) L.G.Lohmann	7251, 7384, 7697	CL	DD	AN	BR
	Fridericia samydoides (Cham.) L.G.Lohmann	6834, 7699	CL	DD	AT	BR
	Jacaranda puberula Cham.	6977	TR	DD	AN	BR
	Pyrostegia venusta (Ker Gawl.) Miers	7171	CL	DI	AN	BR
	Tanaecium selloi (Spreng.) L.G.Lohmann	7735	CL	DD	AT	BR
Boraginaceae	*Cordia trichotoma* (Vell.) Arráb. ex Steud.	7054	TR	DI	AT	BR
	Echium plantagineum L.*	7244	HB	DI	AT	BR
	Moritzia dusenii I.M.Jhonst.	7231	HB	DI	AT	BR
	Myriopus paniculatus (Cham.) Feuillet	7189, 7693	CL	DI	AT	BR
	Varronia polycephala Lam.	7695	SH	-	-	-
Brassicaceae	*Cardamine bonariensis* Pers.*	7151	HB	DD	AT	BR
	Raphanus raphanistrum L.*	7055	HB	DD	AT	BR
Bromeliaceae	*Aechmea recurvata* (Klotzsch) L.B.Sm.	7394	EP	FI	ZC	PU
	Billbergia alfonsijoannis Reitz	7709	EP	FI	ZC	GR
	Tillandsia geminiflora Brongn.	6465	EP	DD	AN	BR
	Tillandsia linearis Vell.	7183, 7338	EP	DD	AN	BR
	Tillandsia stricta Sol.	7056	EP	DD	AN	BR

Continued

Table 1. *Continued.*

FAMILY	SPECIES	# HFC	LF	TF	DS	FC
	Tillandsia usneoides (L.) L.	7614	EP	DD	AN	BR
	Vriesea friburgensis Mez	6511	EP	DD	AN	BR
Cactaceae	*Hatiora salicornioides* (Haw.) Britton & Rose	6525, 7242	EP	FI	ZC	PU
	Lepismium houlletianum (Lem.) Barthlott	7389	EP	FI	ZC	RE
	Rhipsalis campos-portoana Loefgr.	6383	EP	FI	ZC	OR
	Rhipsalis floccosa Salm-Dyck. ex Pfeiff.	6532	EP	FI	ZC	PU
Campanulaceae	*Siphocampylus verticillatus* (Cham.) G.Don	7061	HB	DD	AT	BR
Canellaceae	*Cinnamodendron dinisii* Schwacke	6521	TR	FI	ZC	RE
Caprifoliaceae	*Lonicera japonica* Thunb. ex Murray*	6474, 6477	SH	FI	ZC	BL
	Valeriana scandens L.	6448, 6935, 7193	CL	DD	AN	BR
Cardiopteridaceae	*Citronella gongonha* (Mart.) R.A.Howard	6523	TR	FI	ZC	BL
	Citronella paniculata (Mart) R.A.Howard	6378, 7149	TR	FI	ZC	BL
Caryophyllaceae	*Cerastium rivulariastrum* Möchl & Pedersen *	7248	HB	DD	AT	BR
	Spergula arvensis L. *	7245	HB	DD	AT	BR
Celastraceae	*Maytenus ilicifolia* Mart. ex Reissek	6716	SH	FD	ZC	OR
	Maytenus gonoclada Mart.	6473	TR	FD	ZC	OR
Clethraceae	*Clethra scabra* Pers.		TR	DD	AT	BR
Commelinaceae	*Commelina erecta* L.	7373, 7717	HB	-	-	-
	Commelina obliqua Vahl	7060	HB	-	-	-
	Dichorisandra hexandra (Aubl.) C.B.Clarke	7340, 7755	HB	-	-	-
	Tradescantia cerinthoides Kunth	7372	HB	-	-	-
	Tradescantia fluminensis Vell.	7184	HB	-	-	-
	Tripogandra diuretica (Mart.) Handlos	7754	HB	-	-	-
Convolvulaceae	*Convolvulus crenatifolius* Ruiz & Pav.	7048, 7049	CL	DD	AT	BR
	Ipomoea cairica (L.) Sweet	7629	CL	DD	AT	BR
	Ipomoea coccinea L.	7050	CL	DD	AT	BR
	Ipomoea indica (Burm.) Merr.	7716	CL	DD	AT	BR
	Ipomoea indivisa (Vell.) Hallier f.	7047	CL	DD	AT	BR
	Ipomoea purpurea (L.) Roth	7051	CL	DD	AT	BR
	Ipomoea saopaulista O`Donell	7740	CL	DD	AT	BR
Cornaceae	*Cornus florida* L*.	6751	TR	-	-	-
Cucurbitaceae	*Cayaponia bonariensis* (Mill.) Mart. Crov.	7621	CL	FI	ZC	RE
	Cayaponia cabocla (Vell.) Mart.	7619	CL	FI	ZC	RE
	Sicydium gracile Cogn.	6950, 7150, 7720	CL	FI	ZC	BL
Cunoniaceae	*Lamanonia ternata* Vell.	6697	TR	DD	AT	BR
Cyperaceae	*Carex brasiliensis* A.St.-Hil.	7224	HB	DI	AT	BR
	Cyperus hermaphroditus (Jacq.) Standl.	7059	HB	DI	AT	BR
	Kyllinga odorata Vahl	7719	HB	DI	AT	BR
	Rhynchospora exaltata Kunth	7062	HB	DI	AT	BR
	Scleria latifolia Sw.	6407	HB	DI	AT	BR
Dioscoreaceae	*Dioscorea demourae* Uline ex R.Knuth	7000	CL	DD	AN	BR
	Dioscorea sinuata Vell.	7739	CL	FI	ZC	GR
Elaeocarpaceae	*Sloanea hirsuta* (Schott) Planch. ex Benth.		TR	DD	AT	BR
Erythroxylaceae	*Erythroxylum deciduum* A.St.-Hil.	6528, 6529	TR	FI	ZC	RE
Escalloniaceae	*Escallonia bifida* Link & Otto	6495	SH	DD	AT	BR
Euphorbiaceae	*Alchornea sidifolia* Müll.Arg	7529	TR	DD	AT	BR
	Bernardia pulchella (Baill.) Müll.Arg.	7140, 7199	SH	DD	AT	BR
	Croton celtidifolius Baill.	7217	TR	DD	AT	BR
	Croton reitzii L.B.Sm. & Downs	6462, 7218, 7255	SH	DD	AT	BR
	Dalechampia micromeria Baill.	7701	CL	DD	AT	BR
	Euphorbia heterophylla L.	7668	HB	DD	AT	BR
	Euphorbia peplus L.	7139	HB	-	AT	-
	Gymnanthes klotzschiana Müll.Arg.	6472	TR	DD	AT	BR
	Manihot grahamii Hook.	7742	SH	DD	AT	GR
	Sapium glandulosum (L.) Morong	7598	TR	DD	AT	BR
	Sebastiania brasiliensis Spreng.	7198, 7427	SH	DD	AT	BR
	Tragia volubilis L.	6999	CL	DD	AT	BR
Fabaceae	*Acacia mearnsii* De Wild.*	7164	TR	DD	AT	BR
	Bauhinia forficata Link subsp. *forficata*	7711	TR	DD	AT	BR
	Canavalia bonariensis Lindl.	7403	CL	DI	AT	BR
	Cochliasanthus caracalla (L.) Trew	6991, 6992	CL	DD	AT	BR

Continued

Table 1. *Continued.*

FAMILY	SPECIES	# HFC	LF	TF	DS	FC
	Crotalaria lanceolata E.Mey.*	6997	HB	DD	AT	BR
	Dahlstedtia floribunda (Vogel) M.J.Silva & A.M.G.Azevedo	7740, 7763	TR	DI	AN	BR
	Dalbergia brasiliensis Vogel	7425	TR	DD	AN	BR
	Dalbergia frutescens (Vell.) Britton	7674	CL	DD	AN	BR
	Desmodium adscendens (Sw.) DC.	6996	HB	DI	ZC	BR
	Desmodium affine Schltdl.	6994, 7667	HB	DI	ZC	BR
	Desmodium incanum (Sw.) DC.	6995	HB	DI	ZC	BR
	Desmodium uncinatum (Jacq.) DC.	6507	CL	DI	ZC	BR
	Erythrina cristagalli L.	7673	TR	DI	AT	BR
	Erythrina falcata Benth.		TR	DI	AN	BR
	Neonotonia wightii (Graham ex Wigth & Arn.) J.A.Lackey *	7670	HB	DD	AT	BR
	Inga sellowiana Benth.		TR	FI	ZC	YE
	Lonchocarpus sp.		TR	DI	AT	BR
	Lotus corniculatus L.*	6998	HB	DD	AT	BR
	Machaerium paraguariense Hassl.	6453, 7637, 7757	TR	DI	AN	BR
	Machaerium stipitatum Vogel		TR	DI	AN	BR
	Macroptilium erythroloma (Mart. ex Benth.) Urb.	7624	HB	-	-	-
	Medicago sp. *	7607	HB	DD	AT	BR
	Melilotus indicus (L.) All. *	6993	HB	DD	AT	BR
	Mimosa dolens Vell. subsp. a*cerba* (Benth.) Barneby	7751	SH	DD	AT	BR
	Mimosa scabrella Benth.		TR	DD	AT	BR
	Rhynchosia corylifolia Mart. ex Benth.	7404	HB	DD	AT	BR
	Senna araucarietorum H.S.Irwin & Barneby	6736, 7254	SH	DD	AT	BR
	Senna multijuga (Rich.) H.S.Irwin & Barneby	7530	TR	DD	AT	BR
	Senna neglecta (Vogel) H.S.Irwin & Barneby	7654	SH	DD	AT	BR
	Trifolium pratense L. *	7406	HB	-	-	-
	Trifolium repens L. *	7405	HB	-	-	-
	Vicia sativa subsp. *nigra* (L.) Ehrh. *	6724 a	CL	DD	AT	BR
	Vicia villosa Roth *	6724 b	CL	DD	AT	BR
	Wisteria floribunda (Willd.) DC.*	7200	CL	DI	AT	BR
Gesneriaceae	*Sinningia douglasii* (Lindl.) Chautems	6305	EP	-	-	-
Hypoxidaceae	*Hypoxis decumbens* L.	7261	HB	DD	AT	BR
Hydroleaceae	*Hydrolea spinosa* L. var. *spinosa*	7588	HB	DD	AT	BR
Hypericaceae	*Hypericum rigidum* A.St.-Hil.	7741	SH	DD	AT	BR
Iridaceae	*Calydorea campestris* (Klatt) Baker	7283	HB	DD	AN	BR
	Crocosmia x crocosmiiflora (Lemoine) N.E.Br. *	6989	HB	DD	AT	BR
	Freesia sp. *	6728	HB	-	-	-
	Iris pseudacorus L. *	7375	HB	-	-	-
	Sisyrinchium vaginatum Spreng.	6990	HB	DD	AT	BR
Juncaceae	*Juncus microcephalus* Kunth	7617	HB	DD	AT	BR
Lamiaceae	*Aegiphila integrifolia* (Jacq.) Moldenke	6397	TR	FI	ZC	RE
	Aegiphila sp.	6538	SH	FI	ZC	OR
	Hyptis lappulacea Mart. ex Benth.	7660	HB	DD	AT	BR
	Cantinoa mutabilis (Rich.) Harley & J.F.B.Pastore	6987	HB	DD	AT	BR
	Leonurus sibiricus L. *	7146, 7265	HB	DD	AT	BR
	Ocimum carnosum (Spreng.) Link & Otto ex Benth.	7176	HB	-	-	-
	Prunella vulgaris L. *	7608	HB	-	-	-
	Salvia involucrata Cav.*	6986	SH	-	-	-
	Salvia melissiflora Benth.	7381	SH	-	-	-
	Vitex megapotamica (Spreng.) Moldenke	6489	TR	FI	ZC	BL
Lauraceae	*Cinnamomum amoenum* (Nees & Mart.) Kosterm.	6428, 6429, 6698	TR	FI	ZC	BL
	Cinnamomum sellowianum (Nees & Mart. ex Nees) Kosterm.	6408, 6708, 6710	TR	FI	ZC	BL
	Cryptocarya aschersoniana Mez	6737	TR	FI	ZC	YE
	Nectandra lanceolata Nees	6422	TR	FI	ZC	BL
	Ocotea corymbosa (Meisn.) Mez	6400, 6446	TR	FI	ZC	BL
	Ocotea glaziovii Mez	7332	TR	FI	ZC	BL
	Ocotea nectandrifolia Mez	6817	TR	FI	ZC	BL
	Ocotea nutans (Nees) Mez	7644, 7645	TR	FI	ZC	BL
	Ocotea odorifera (Vell.) Rohwer	7359	TR	FI	ZC	BL
	Ocotea porosa (Nees. & Mart.) Barroso	6421, 6425, 6449	TR	FI	ZC	BL
	Ocotea puberula (Rich.) Nees	6754, 7148	TR	FI	ZC	BL

Continued

Table 1. *Continued.*

FAMILY	SPECIES	# HFC	LF	TF	DS	FC
	Ocotea sp.	7364, 7669	TR	FI	ZC	BL
	Ocotea tristis (Nees & Mart.) Mez	7226	TR	FI	ZC	BL
	Persea major (Meisn.) L.E.Kopp	7426	TR	FI	ZC	BL
Laxmanniaceae	*Cordyline spectabilis* Kunth & Bouché	6481	SH	FI	ZC	BL
Liliaceae	*Lilium regale* E.H. Wilson *	6988	HB	DD	AN	BR
Loganiaceae	*Strychnos brasiliensis* Mart.	6470	TR	FD	ZC	OR
Loranthaceae	*Struthanthus martianun* Dettke & Waechter	6469	HM	FI	ZC	BL
	Struthanthus polyrhizus (Mart.) Mart.	6471	HM	FI	ZC	BL
	Struthanthus sp.	7737	HM	FI	ZC	BL
Lythraceae	*Cuphea calophylla* subsp. *mesostemon* (Koehne) Lourteig		SH	DD	AT	BR
	Cuphea polymorpha A.St.-Hil.	6980	SH	DD	AT	BR
	Cuphea thymoides Cham. & Schltdl.	6981	SH	DD	AT	BR
	Heimia apetala (Spreng.) S.A.Graham & Gandhi	6445	SH	DD	AT	BR
	Lafoensia pacari A.St.-Hil.	7424	TR	DD	AN	BR
Malpighiaceae	*Heteropterys syringifolia* Griseb		CL	DI	AT	BR
Malvaceae	*Abutilon costicalyx* K.Schum. ex C.Takeuchi & G.L.Esteves	7078	SH	DD	AT	BR
	Callianthe rufinerva (A.St.-Hil.) Donnel	7142, 7143	SH	DD	AT	BR
	Luehea divaricata Mart. & Zucc.	7423	TR	DD	AT	BR
	Pavonia dusenii Krapov.	7080	SH	DD	AT	BR
	Pavonia garckeana Gürke	7073	SH	DD	AT	BR
	Pavonia schrankii Spreng.	7082, 7081	SH	DD	AT	BR
	Pavonia sepium A.St.-Hil.	6835, 7053	SH	DD	ZC	BR
	Sida planicaulis Cav.	7074	SH	DD	AT	BR
	Sida potentilloides A.St.-Hil.	7075	SH	DD	AT	BR
	Sida rhombifolia L.	7076, 7077	SH	DD	AT	BR
	Triumfetta semitriloba Jacq.	7665	SH	DD	ZC	BR
	Wissadula parviflora (A.St.-Hil.) R.E.Fr.	7653	SH	DD	ZC	BR
Melastomataceae	*Leandra australis* (Cham.) Cogn.	6467, 6703, 7367	SH	FI	ZC	PU
	Leandra carassana (DC.) Cogn.	6385, 6386, 6702	SH	FI	ZC	BL
	Leandra cordifolia Cogn.	6437	SH	FI	ZC	PU
	Leandra laevigata (Triana) Cogn.	6740	SH	FI	ZC	PU
	Leandra purpurascens (DC.) Cogn.	6380	SH	FI	ZC	PU
	Leandra sp.	7064, 7419	HB	FI	ZC	RE
	Leandra xanthocoma (Naudin) Cogn.	7685	SH	FI	ZC	PU
	Miconia cinerascens Miq. var. *cinerascens*	7070	SH	FI	ZC	BL
	Miconia hyemalis A.St.-Hil. & Naudin	6468	SH	FI	ZC	BL
	Miconia petropolitana Cogn.	6392, 6393, 7065	SH	FI	ZC	BL
	Miconia sellowiana Naudin	6705	SH	FI	ZC	OR
	Rhynchantera sp.	7745	SH	DD	AT	BR
	Tibouchina cerastifolia Cogn.	7067	SH	DD	AT	BR
	Tibouchina clinopodifolia Cogn.	7066	SH	DD	AT	BR
	Tibouchina debilis Cogn.	7652	SH	DD	AT	BR
	Tibouchina gracilis (Bonpl.) Cogn.	7068, 7069	SH	DD	AT	BR
	Tibouchina pilosa Cogn.	7664	SH	DD	AT	BR
	Tibouchina sellowiana Cogn.	7663	TR	DD	AT	BR
Meliaceae	*Cabralea canjerana* (Vell.) Mart. subsp. *canjerana*	6347	TR	FD	ZC	RE
Menispermaceae	*Cissampelos pareira* L.	7707	CL	FI	ZC	RE
Monimiaceae	*Mollinedia clavigera* Tul.	6388, 6389, 6431	SH	FI	ZC	BL
	Mollinedia schottiana (Spreng.) Perkins	6381, 6390	SH	FI	ZC	BL
Moraceae	*Ficus eximia* Schott	6395, 6785, 6949	TR	FI	ZC	PU
	Ficus luschnathiana (Miq.) Miq.	6402, 6403, 6517	TR	FI	ZC	PU
	Morus nigra L.*	7207	TR	FI	ZC	PU
	Sorocea bonplandii (Baill.) W.C.Burger et al	6717, 7182	TR	FI	ZC	RE
Myrtaceae	*Calyptranthes lucida* Mart. ex DC.	6505, 7172	TR	FI	ZC	RE
	Campomanesia guaviroba (DC.) Kiaersk.	6427, 6510, 7072	TR	FI	ZC	OR
	Campomanesia xanthocarpa (Mart.) O.Berg	6527	TR	FI	ZC	OR
	Eugenia handroana D.Legrand	6700, 6722	TR	FI	ZC	BL
	Eugenia neoverrucosa Sobral	6441, 7358	TR	FI	ZC	YE
	Eugenia platysema O.Berg	7071	SH	FI	ZC	-
	Eugenia pyriformis Cambess.	5623	TR	FI	ZC	YE
	Myrceugenia euosma (O. Berg) D.Legrand	7649	TR	FI	ZC	BL

Continued

Table 1. *Continued.*

FAMILY	SPECIES	# HFC	LF	TF	DS	FC
	Myrceugenia miersiana (Gardner) D.Legrand & Kausel	6410	TR	FI	ZC	BL
	Myrceugenia aculata D.Legrand	7400	SH	FI	ZC	BL
	Myrcia brasiliensis Kiaersk.	6513	TR	FI	ZC	RE
	Myrcia hatschbachii D.Legrand	7292	TR	FI	ZC	BL
	Myrcia guianensis (Aubl.) DC.	6419, 6451	SH	FI	ZC	BL
	Myrcia laruotteana Cambess.	6443, 6714, 7280	TR	FI	ZC	RE
	Myrcia selloi (Spreng.) N.Silveira	6741, 7220	TR	FI	ZC	BL
	Myrcia splendens (Sw.) DC.	7334, 7335, 7647	TR	FI	ZC	BL
	Myrcia undulata O.Berg	6742	TR	FI	ZC	BL
	Myrcia sp.	6833	TR	FI	ZC	RE
	Pimenta pseudocaryophyllus (Gomes) Landrum	6460	TR	FI	ZC	BL
Oleaceae	*Chionanthus filiformis* (Vell.) P.S.Green	7168, 7264	TR	FI	ZC	BL
	Ligustrum japonicum Thunb.*		TR	FI	ZC	PU
	Ligustrum sinense Lour. *	6739	TR	FI	ZC	BL
Onagraceae	*Fuchsia* sp.		CL	-	-	-
	Ludwigia caparosa (Cambess.) H.Hara	6956	HB	DD	AT	BR
	Ludwigia decurrens Walter	7628	HB	DD	AT	BR
	Ludwigia sericea (Cambess.) H.Hara	6955, 7681	HB	DD	AT	BR
	Oenothera affinis Cambess.	7236	HB	DD	AT	BR
	Oenothera ravenii W.Dietr.	7167	HB	DD	AT	BR
Orchidaceae	*Acianthera sonderana* (Rchb.f.) Pridgeon & W.M.Chase	6515	EP	-	-	-
	Campylocentrum grisebachii Cogn.	7376	EP	-	-	-
	Chloraea membranacea Lindl.	7225	HB	-	-	-
	Gomesa recurva R.Br.	7746	EP	-	-	-
	Govenia utriculata (Sw.) Lindl.	6953	HB	-	-	-
	Habenaria exaltata Barb.Rodr.	7736	HB	-	-	-
	Malaxis excavata (Lindl.) Kuntze	7752	HB	-	-	-
	Phymatidium delicatulum Lindl.	7422, 7610	EP	-	-	-
	Prescottia stachyodes (Sw.) Lindl.	6957	HB	-	-	-
	Sacoila lanceolata (Aubl.) Garay	7377	HB	-	-	-
	Specklinia grobyi (Batem. ex Lindl.) F.Barros	7397	EP	-	-	-
Orobanchaceae	*Agalinis communis* (Cham. & Schltdl.) D'Arcy	6930, 7770	HM	DD	AT	BR
	Agalinis genistifolia (Cham. & Schltdl.) D'Arcy	6929	HM	DD	AT	BR
Oxalidaceae	*Oxalis bipartita* A.St.-Hil.	6748	HB	DD	AT	BR
	Oxalis latifolia Kunth	6976, 7368	HB	DD	AT	BR
	Oxalis niederleinii Knuth	6747	HB	DD	AT	BR
	Oxalis triangularis A.St.-Hil.	6954	HB	DD	AT	BR
Passifloraceae	*Passiflora actinia* Hook.	7391	CL	FI	ZC	YE
	Passiflora amethystina J.C.Mikan	7748	CL	FI	ZC	-
	Passiflora caerulea L.	6968	CL	FI	ZC	YE
	Passiflora edulis Sims	6391, 7272	CL	FD	ZC	YE
	Passiflora porophylla Vell.	7749	CL	FI	ZC	-
Phyllanthaceae	*Phyllanthus tenellus* Roxb.	7700	HB	DD	AT	BR
Phytolaccaceae	*Phytolacca thyrsiflora* Fenzl ex J.A. Schmidt	6972	SH	FI	ZC	PU
Picramniaceae	*Picramnia parvifolia* Engl.	6432, 7678	SH	FI	ZC	RE
Piperaceae	*Peperomia blanda* (Jacq.) Kunth	6964	EP	FI	ZC	GR
	Peperomia catharinae Miq.	7178, 7179, 7290	EP	FI	ZC	GR
	Peperomia corcovadensis Gardner	7180	EP	FI	ZC	GR
	Peperomia tetraphyla (G. Forst.) Hook. & Arn.	7181	EP	FI	ZC	GR
	Peperomia urocarpa Fisch. & C.A.Mey.	7301	EP	FI	ZC	GR
	Piper gaudichaudianum Kunth	6351, 6413, 6488	SH	FI	ZC	GR
	Piper mikanianum (Kunth) Steud.	6358, 6360	SH	FI	ZC	GR
	Piper mosenii C.DC.	6359	SH	FI	ZC	GR
	Piper xylosteoides (Kunth) Steud.	6411, 6487, 6532	SH	FI	ZC	GR
Plantaginaceae	*Mecardonia procumbens* (Mill.) Small	6932	HB	DD	AT	BR
	Plantago lanceolata L.	7622	HB	DD	AT	BR
	Plantago tomentosa Lam.	7260	HB	DD	AT	BR
	Scoparia dulcis L.	6928	HB	DD	AT	BR
	Veronica persica Poir *	7270	HB	DD	AT	BR
Poaceae	*Andropogon bicornis* L.	7631	HB	DD	AN	BR
	Briza minor L. *	7611	HB	DD	AT	BR

Continued

Table 1. *Continued.*

FAMILY	SPECIES	# HFC	LF	TF	DS	FC
	Bromus catharticus Vahl	7273	HB	DD	AT	BR
	Cenchrus purpureus (Schumach.) Morrone	6960	HB	DD	AT	BR
	Chascolytrum lamarckianum (Nees) Matthei	7293, 7294	HB	DD	AT	BR
	Coix lacryma-jobi L. *	6961	HB	DD	AT	BR
	Eustachys uliginosa (Hack.) Herter	7252	HB	DD	AT	BR
	Ichnanthus pallens (Sw.) Munro ex. Benth.	7744	HB	DD	AT	BR
	Lolium multiflorum L. *	7177	HB	DD	AT	BR
	Merostachys multiramea Hack.	7100, 7275	SH	DD	AT	BR
	Pharus lappulaceus Aubl.	6963, 7634	HB	DD	AT	BR
	Pseudechinolaena polystachya (Kunth) Stapf	6959	HB	DD	AT	BR
	Saccharum asperum (Nees) Steud.	6958, 7750	HB	DD	AT	BR
	Setaria scabrifolia (Nees) Kunth	6962, 7747	HB	DD	AT	BR
Podocarpaceae	*Podocarpus lambertii* Klotzsch ex Endl.	5934	TR	DI	ZC	PU
Polygalaceae	*Polygala lancifolia* A.St. Hil. & Moq.	6969	HB	DD	AT	BR
Polygonaceae	*Polygonum acuminatum* Kunth	7743	HB	DD	AT	BR
	Polygonum persicaria L.	6971	HB	DD	AT	BR
	Rumex obtusifolius L.	7187	HB	DD	AT	BR
Primulaceae	*Lysimachia arvensis* (L.) U.Manns & Anderb.	7269	HB	-	-	-
	Myrsine coriacea (Sw.) R.Br. ex Roem. & Schult.	6354, 6451, 6542	TR	FI	ZC	BL
	Myrsine parvula (Mez) Otegui	7169	TR	FI	ZC	BL
	Myrsine umbellata Mart.	6711, 6712, 6713	TR	FI	ZC	RE
Proteaceae	*Roupala montana* var. *brasiliensis* (Klotzsch) K.S.Edwards	7708, 7662	TR	DD	AT	BR
Ranunculaceae	*Clematis dioica* L.	7206	CL	DI	AN	BR
Rhamnaceae	*Hovenia dulcis* Thunb. *		TR	DD	ZC	BR
	Rhamnus sphaerosperma Sw.	6371, 6941	SH	FI	ZC	RE
Rosaceae	*Cotoneaster franchetii* Bois *	6476	TR	FI	ZC	RE
	Eriobotrya japonica (Thunb.) Lindl.*		TR	FI	ZC	YE
	Prunus brasiliensis (Cham. & Schltdl.) D.Dietr.	6357, 6375, 6458	TR	FI	ZC	BL
	Prunus myrtifolia (L.) Urb.	6479	TR	FI	ZC	BL
	Rubus brasiliensis Mart.	6484	SH	FI	ZC	GR
	Rubus erythrocladus Mart. ex Hook.	7387	SH	FI	ZC	RE
	Rubus urticifolius Poir.	6543	SH	FI	ZC	BU
	Spiraea cantoniensis Lour. *	6731	SH	-	ZC	-
Rubiaceae	*Borreria tenella* (Kunth) Cham. & Schltdl.	6926	HB	DD	AT	BR
	Chomelia brasiliana A.Rich.	6704	TR	FI	ZC	BL
	Coccocypselum lanceolatum (Ruiz & Pav.) Pers.	6482	HB	FI	ZC	PU
	Coccocypselum pulchellum Cham.	7291	HB	FI	ZC	PU
	Cordiera concolor (Cham.) Kuntze	6355, 6439, 6500	TR	FI	ZC	BL
	Diodia saponariifolia (Cham. & Schltdl.) K.Schum.	7771	HB	DD	AT	BR
	Galium hatschbachii Dempster	6707	HB	FI	ZC	OR
	Galium hypocarpium (L.) Endl. ex Griseb.	6350	HB	FI	ZC	OR
	Manettia luteo-rubra (Vell.) Benth.	6925	CL	DD	AT	BR
	Manettia paraguariensis Chodat	6727	CL	DD	AT	BR
	Palicourea australis C.M.Taylor	6537, 7679	SH	FI	ZC	BL
	Psychotria carthagenensis Jacq.	7683, 7684	SH	FI	ZC	BR
	Psychotria vellosiana Benth.	6709	TR	FI	ZC	BL
	Psychotria stachyoides Benth.	6738, 7263	HB	FI	ZC	AZ
	Psychotria suterella Müll.Arg.	6368, 6369	SH	FI	ZC	PU
	Psychotria sp.	6384, 6438, 7428	SH	FI	ZC	BL
	Randia armata (Sw.) DC.	6720	TR	FI	ZC	YE
	Rudgea jasminoides (Cham.) Müll.Arg.	6475, 6483, 6546	SH	FI	ZC	RE
	Rudgea parquioides (Cham.) Müll.Arg.	6430, 7202	SH	FI	ZC	RE
	Coussarea contracta (Walp.) Müll.Arg.	7174	TR	FI	ZC	YE
Rutaceae	*Zanthoxylum rhoifolium* Lam.	6366	TR	DD	ZC	RE
Salicaceae	*Banara parviflora* (A.Gray) Benth.	7636	TR	FI	ZC	RE
	Casearia decandra Jacq.	6506, 6534	TR	FI	ZC	OR
	Casearia lasiophylla Eichler	6696, 6735	TR	FI	ZC	YE
	Casearia obliqua Spreng.	7300, 7650	TR	FI	ZC	RE
	Casearia sylvestris Sw.	6346, 6365	TR	FD	ZC	RE
	Xylosma ciliatifolia (Clos) Eichler	7185	SH	FI	ZC	RE
	Xylosma pseudosalzmanii Sleumer	6379	TR	FI	ZC	RE

Continued

Table 1. *Continued.*

FAMILY	SPECIES	# HFC	LF	TF	DS	FC
Sapindaceae	*Allophylus edulis* (A.St.-Hil. et al.) Hieron ex Niederl.	6344, 6361, 6544	TR	FI	ZC	RE
	Allophylus guaraniticus (A.St.-Hil.) Radlk.	6501	TR	FI	ZC	RE
	Cardiospermum halicacabum L.	7775, 7776	CL	DD	AT	BR
	Matayba elaeagnoides Radlk.	6519	TR	FD	ZC	YE
	Serjania laruotteana Cambess.	7773, 7774	CL	DI	AN	BR
	Serjania lethalis A.St.-Hil.	7532	CL	DI	AN	BR
	Serjania unidentata Acev.-Rodr	7191, 7192	CL	DI	AN	BR
Scrophulariaceae	*Buddleja stachyoides* Cham. & Schltdl.	6733, 6749	HB	DD	AT	BR
	Verbascum virgatum Stokes *	7194	HB	DD	AT	-
Smilacaceae	*Smilax campestris* Griseb.	6382, 6496	CL	FI	ZC	RE
Solanaceae	*Aureliana fasciculata* (Vell.) Sendtn.	6416, 6417, 6418	SH	FI	ZC	GR
	Brugmansia suaveolens (Willd.) Bercht. & J.Presl *		SH	DD	AT	BR
	Brunfelsia pilosa Plowman	6516	SH	DD	AT	BR
	Calibrachoa dusenii (R.E.Fr.) Stehmann & Semir	6916	HB	DD	AT	BR
	Cestrum bracteatum Link & Otto	6409, 6433, 6539	SH	FI	ZC	BL
	Cestrum corymbosum Schltdl.	6504, 6721	SH	FI	ZC	BL
	Dyssochroma longipes (Sendtn.) Miers	7137, 7173, 7222	EP	-	-	-
	Nicandra physalodes (L.) Gaertn. *	7196	HB	DD	AT	BR
	Solanum americanum Mill.	6520	SH	FI	ZC	BL
	Solanum campaniforme Roem & Schult.	6436, 6503, 7677	TR	FI	ZC	GR
	Solanum commersonii Dunal	6423, 6424	HB	FI	ZC	YE
	Solanum corymbiflorum (Sendtn.) Bohs	7682	SH	-	ZC	-
	Solanum dydimun Dunal	6497, 6498, 6518	SH	FI	ZC	BL
	Solanum granulosoleprosum Dunal	6372, 6373, 6374	TR	FI	ZC	GR
	Solanum inodorum Vell.	6922	CL	FI	ZC	BL
	Solanum melissarum Bohs	6918	HB	-	ZC	-
	Solanum nigrescens M.Martens & Galeotti	6920, 7613	HB	FI	ZC	BL
	Solanum nigrum L.	6499	HB	FI	ZC	BL
	Solanum pseudoquina A. St.-Hil.	6399	TR	FI	ZC	GR
	Solanum ramulosum Sendtn.	6426, 7421	SH	FI	ZC	BL
	Solanum rufescens Sendtn.	6376, 6744	TR	FI	ZC	GR
	Solanum sanctae-catharinae Dunal	6349, 6459	TR	FI	ZC	GR
	Solanum sciadostylis (Sendtn.) Bohs	6919	HB	-	ZC	-
	Solanum swartzianum Roem. & Schult.	6734	TR	FI	ZC	BL
	Solanum vaillantii Dunal	6921	HB	FI	ZC	BL
	Solanum variabile Mart.	6457	SH	FI	ZC	OR
	Vassobia breviflora (Sendtn.) Hunz.	6461	TR	FI	ZC	RE
Styracaceae	*Styrax leprosus* Hook. & Arn.	6356	TR	FI	ZC	BL
Symplocaceae	*Symplocos glandulosomarginata* Hoehne	7661	TR	FI	ZC	RE
	Symplocos laxiflora Benth.	6509	TR	FI	ZC	BL
	Symplocos tenuifolia Brand	6526	TR	FI	ZC	BL
	Symplocos tetrandra Mart.	6348, 6352, 6706	TR	FI	ZC	BL
	Symplocos uniflora (Pohl) Benth.	6363	TR	FI	ZC	BL
Theaceae	*Laplacea fruticosa* (Schrad.) Kobuski	6732, 7235	TR	DD	AT	BR
Thymelaeaceae	*Daphnopsis fasciculata* (Meisn.) Nevling	6693, 6694, 6695	SH	FI	ZC	BL
Typhaceae	*Typha domingensis* Pers.	7618	HB	DD	AN	BR
Urticaceae	*Pilea microphylla* (L.) Liebm.	6936	HB	DD	AT	BR
Verbenaceae	*Duranta vestita* Cham.	6514	TR	FI	ZC	YE
	Lantana camara L.	6526	SH	FI	ZC	BL
	Lantana fucata Lindl.	6750	SH	-	ZC	-
	Lippia brasiliensis (Link) T.R.S.Silva	6502	SH	-	ZC	-
	Stachytarpheta cayennensis (Rich.) Vahl	7623	SH	-	-	-
	Verbena montevidensis Spreng.	7253	SH	-	ZC	-
	Verbena rigida Spreng.	6719	HB	DD	AT	BR
Vitaceae	*Cissus striata* subsp. *argentina* (Suess.) Lombardi	7756, 7766, 7767	CL	FI	ZC	BL
	Cissus verticillata (L.) Nicolson & C.E.Jarvis	6447, 6934	CL	FI	ZC	BL
	Cissus sp.	7531	CL	FI	ZC	BL
Winteraceae	*Drimys brasiliensis* Miers var. *brasiliensis*		TR	FI	ZC	BL
Xanthorrhoeaceae	*Kniphofia uvaria* (L.) Oken.*	6985	HB	-	-	-
Zingiberaceae	*Hedychium coronarium* J.Koening *		HB	FD	ZC	RE

Table 2. Number of species, genera and families collected per life form in Araucaria Forest remnants, Colombo, Paraná, Brazil.

	Trees	Shrubs	Herbs	Climbers	Epiphytes	Hemiparasites
Species	135	121	157	70	24	5
Genera	87	70	130	45	16	1
Families	34	14	33	15	5	1

Table 3. Type of fruit and dispersal syndromes of plant species collected in Araucaria Forest remnants, Colombo, Piraná, Brazil.

	Trees	Shrubs	Herbs	Climbers	Epiphytes	Hemiparasites
Dispersal syndromes						
Zoochory	98 (73)	54 (47)	16 (12)	17 (25)	11 (69)	3 (60)
Anemochory	17 (13)	30 (26)	37 (28)	23 (34)	5 (31)	-
Autochory	18 (14)	32 (27)	78 (60)	28 (41)	-	2 (40)
Type of fruit						
Fleshy dehiscent	6 (5)	1 (1)	1 (1)	1 (1)	-	-
Fleshy indehiscent	88 (66)	44 (40)	10 (8)	15 (22)	11 (69)	3 (60)
Dry dehiscent	21 (16)	33 (31)	78 (61)	33 (49)	5 (31)	2 (40)
Dry indehiscent	18 (13)	31 (28)	39 (30)	19 (28)	-	-

16 species (12%). Epiphytes and hemiparasites also presented zoochory as the most common syndrome, accounting for 68% and 60% of species, respectively.

Of the 459 species classified according to fruit type, 172 were dry dehiscent, followed by fleshy indehiscent with 171 species, dry indehiscent with 107 and fleshy dehiscent with only nine species (Table 03). Considering the 380 species classified according to the color of their fruits, there was a clear predominance of brown fruits (*n* = 198), followed by black (*n* = 76) and red (*n* = 38); the other 68 species were distributed in ten different colors. With respect to the dispersal mode within these 380 species, zoochorous fruits encompassed eight colors, with predominance of black fruits (*n* = 75), followed by red (*n* = 38), purple (*n* = 18), green (*n* =19), yellow (*n* = 15), orange (*n* = 12), brown (*n* = 10) and wine (*n* = 1). Most anemochorous fruits were brown (*n* = 33), with only one green species. Autochorous fruits were nearly always brown (*n* = 155), although one green species were recorded.

DISCUSSION

To date, this is the study encompassing various life forms that have recorded the greatest number of species in the FOM of Paraná state. In fact, in this Brazilian state, Kozera et al. (2006) have found 390 species in Curitiba, Britez et al. (1995) 307 species in São Mateus do Sul, and Liebsch et al. (2009) 210 species in Bituruna. It is interesting to observe that although several inventories ignore non-trees, this group might represent the majority of the species found in a particular area as in the present study. In fact, previous studies have shown that trees can represent only about half of terrestrial plant diversity (Ishara et al. 2008; Gasper et al. 2013), including FOM areas (Kozera et al. 2006; Liebsch et al. 2009).

The presence of endangered species, coupled with the location of the studied remnants in the vicinity of an important urban center, highlight the importance of the study area for the conservation of genetic resources. Such role, however, might be threatened by the presence of several exotic species, as *Ligustrum japonicum*, *Hovenia dulcis* and *Eriobotrya japonica*, which provide a large supply of zoochorous fruits and can compete for dispersers with native species (Lorenzi et al. 2003; Rose et al. 2008).

In tropical forest ecosystems, zoochory is often the most common dispersal syndrome among trees and shrubs, as well as overall (Howe and Smallwood 1982; Motta-Junior and Lombardi 2002; Almeida-Neto et al. 2008). In fact, such predominance has already been observed in the Dense Ombrophyllous Forest (Tabarelli et al. 1999; Liebsch et al. 2008), the Semideciduous Seasonal Forest (Mikich and Silva 2001; Santos et al. 2003; Yamamoto et al. 2007) and for the FOM (Rondon Neto et al. 2001; Liebsch and Acra 2007; Liebsch et al. 2009; present study). Anemochoric dispersal, usually with several representatives among trees and vines, in the present study was only well represented by the latter. Additionally, anemochorous fruits were less common than autochorous ones, which are usually rare (Vieira et al. 2002; Yamamoto et al. 2007) but in the study area were represented by several species of Fabaceae, Euphorbiaceae and Plantaginaceae.

The fact that most trees and shrubs had fleshy fruits (dehiscent or indehiscent) is probably related to their dispersal syndrome as fleshy fruits are usually zoochorous, while dry fruits are usually anemochorous or autochorous (van der Pijl 1972; Spina et al. 2001). In the present study, dry fruits were more common among herbs and vines.

In a FOM remnant located in Rio Grande do Sul state, Paise and Vieira (2005) analyzed 27 zoochorous species and also found eight different colors of fruit, but in this case, red or orange were the most frequent. In a

Semideciduous Seasonal Forest, Mikich and Silva (2001) observed that zoochorous fruits were predominantly green, black or red. Colored fruits are meant to attract dispersers and different groups of dispersers are drawn preferably by some colors, such that birds tend to prefer black, red, wine or blue fruits, whereas primates prefer orange, yellow or green ones (Howe 1986; Wilson et al. 1990). For autochorous and wind dispersed species, which do not depend on the attraction of biotic agents for dispersing their seeds, Mikich and Silva (2001) found basically red-brownish fruits, here classified as brown.

The high diversity of plant species, the presence of several endangered species (plants, this study; mammals, Dias and Mikich 2006), and the large proportion of species dispersed by animals, emphasize the importance of the study area for the conservation of the Atlantic Forest and the FOM biodiversity. The threats imposed by the proximity of a large urban center are ameliorated by the fact that the area is possessed by a forestry research institution that maintains its native forest remnants as reserves.

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